Amendments To The Specification

Please amend the specification to the following paragraphs below:

[0044] The BHA-drill string display in panel B of [[FIG. 6Band]] FIG. 6B and FIG. 6D provides a scalable visual representation of the drill string and the BHA. The display may include the relative placements of the components along the drill string. This provides a visual aid, from which an experienced technician can easily detect and correct any errors in the design[[. For]] (for example, [[are]] detect if the stabilizers are situated at proper placements (axial locations) along the drill string). [[?]] In addition, the drill string graphics display may include a display of configuration errors. For example, an error flag may be displayed when a component selected from a library or read from a file is not included with the proper connecting components. Errors may be also included according to a set of predetermined rules based on existing drill string requirements. For example, an error message may be displayed indicating that an additional stabilizer is needed and a suggestion for placement is provided.

[0059] [[SSome]] Some embodiments of the invention may include display of well log data along a wellbore, e.g., formation data (e.g., types, density, resistivity, etc.), gamma ray data, and NMR data. Some embodiments of the invention may also display data related to the properties or data of the BHA or drill string, such as weight on bit (WOB), rotation per minute (RPM), rate of penetration (ROP), torque, drag, shocks, etc. Such displays may be by changing colors of components to reflect the stress or the rotation speeds. Similarly, display of torque and drag data may be by bending or color coding components that are under torsional stress, and display of shocks may be by vibrating components that are receiving shocks.

[0060] [[SSome]] Some embodiments of the invention provide inquiry modes in which some or all of these related data may be displayed by user selection. Inquiry mode for each of the above application, e.g., display of quantitative stress values associated with a component indicated as stressed, for example, by color coding. The inquiry mode may be initiated using, for example, mouse selection of a particular component or touch screen selection.

[0061] [[EExamples]] Examples of vector animated graphics include, Shockwave™ by Macromedia which operates as a player for vector animated graphics and [[Flash™by]] Flash™ by Macromedia which generates shockwave files. In the prior art, to achieve the same results as the invention, users must use an animation application, like [[Macromedi"'s]] Macromedia's Director™, to draw, assemble and animate the BHA. This process is time consuming, and the resulting movie will create a large file. Any changes require the user to manually edit the animation, possibly spending as much time as the initial creation.

[0063] [[TThe]] The invention provides the framework for animating any data that can be represented in time or depth that may or may not be related to a measurement. Additional possibilities includes displaying or animating information related to drilling hazards, drilling risks, and drilling events, such as bit-related information (e.g., bit balling, broken cutter, mechanical issues), formation-related information (e.g., fracture risks, formation stability, ballooning, pore pressure, pack off, etc.), borehole dynamics (e.g., gas kicks, water influx, swab, surge, etc.), well-related information (e.g., well collisions, close approach, hole cleaning, collapse, cutting [[buid]] build up, wash out, break out), drill string-related information (e.g., stuck pipe, twist off, torque, drag, shocks, vibration, etc.). In addition, embodiments of the invention may be used to display and animate information related to well data, such as well completions (e.g., casing runs, gavel packing, and perforations, etc.), production/reservoir monitoring, wireline or LWD logging, etc.

[0064] [[EEmbodiments]] Embodiments of the invention may be implemented on any computer. FIG. 11 shows a general computer that may be used with embodiments of the invention. As shown, the computer includes a display 110, a main unit 100, and input devices such as a keyboard 106 and a mouse 108. The main unit 100 may include a central processor 102 and a memory 104. The memory 104 may store programs having instructions for performing methods of the invention. Alternatively, other internal or removable storage may be used, such as a floppy disk, a CD ROM or other optical disk, a magnetic tape, a read-only memory chip (ROM), and other forms of the kind known in the art or subsequently developed. The program of instructions may be in object codes or source codes. The precise forms of the program storage device and of the encoding of instructions are immaterial here.

[0065] [[TThe]] The advantages of embodiments of the invention may include one or more of the following. Embodiments of the invention do not rely on a library of components drawn in raster format, like bitmaps or jpegs. While these formats can produce BHA Graphics with good quality, they cannot maintain the same quality when scaled. This prevents a BHA from being rendered in true scale. Instead, embodiment of the invention uses vector graphics, the components of which are drawn using mathematical formulas. The vector graphics makes it possible to render the components in true scale, while maintaining a high quality of detail.

[0066] [[EEmbodiments]] Embodiments of the invention do not require a user to piece together each individual component to form the BHA. This process can take hours and requires manual modifications if the BHA should change. Embodiments of the invention will automatically draw the BHA without user intervention based on the data provided in the WITSML data source. Embodiments of the Invention will refresh the drawing every time the data source is modified; therefore, any changes will be displayed almost immediately.

[0067] [[EEmbodiments]] Embodiments of the invention do not manually create BHAs by drawing the components and animating the BHA frame by frame, as done in the prior art methods. With the prior art methods, any changes must be made manually by the user, which could take as many hours as the initial movie, and any modifications will require the movie to be recompiled and redistributed. In contrast, movies created by methods of the invention are completely dynamic and completed in a few seconds. Any changes made to the data source will immediately be reflected in the movie. The generation of the movie is completely automatic and requires no user intervention. A single copy of the control can display any number of different movies; all [[that"s]] that is required are different data sources.

[0068] [[PPrior]] Prior art methods for displaying BHA create large files. With decent quality, the resulting one-minute movie may be over 30 megabytes. In contrast, movies generated with methods of the invention are typically less than 100K and can easily animate an [[hour"s]] hour's worth of data. Because the data is stored in a WITSML file or streamed through a Socket, embodiments of the invention only require the memory space taken up by the component library and internal components.

[0069] [[PPrior]] Prior art methods for displaying BHA require large files. The libraries used by existing applications contain components drawn in a raster format. This format usually results in large files if rendered with decent quality. In contrast, embodiments of the invention use vector drawn components, resulting in very small file sizes even when rendered with high quality and detail.

[0070] [[PPrior]] Prior art methods for displaying BHA are platform dependent and require special applications to generate and display the graphics. In contrast, embodiments of the invention is platform independent and completely portable. Since WISTML is basically text, it can be transferred to any platform. The invention can run in any Shockwave enabled web browser (97% of web browsers are Shockwave enabled). The result is a dynamic, animated BHA that can be created and displayed using only a text editor and web browser.

[0071] [[PPrior]] Prior methods for viewing down hole and surface measurements are accomplished by viewing the data in a log format. Each measurement is displayed as a graphical line relative to time (similar to a stock ticker). To determine simple drilling modes requires monitoring a multitude of measurements. This invention represents the down hole and surface measurements with an animated graphic that provide a detailed visualization of the effects each measurement has on the BHA.

[0072] [[WWhile]] While the invention has been described with respect to a limited number of embodiments, those skilled in the art, having benefit of this disclosure, will appreciate that other embodiments can be devised which do not depart from the scope of the invention as disclosed herein. Accordingly, the scope of the invention should be limited only by the attached claims.